ANNUAL REPORT FOR 2009

Jeffrey's Warehouse Wetland Mitigation Site
Wayne County
TIP No. R-1030AA

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

SUMMARY

The following report summarizes the wetland monitoring activities conducted during 2009 at the Jeffrey's Warehouse Mitigation Site. This site, situated on US 117 in Goldsboro, was designed and constructed during 2006 by the North Carolina Department of Transportation (NCDOT) in order to provide mitigation for wetland impacts associated with the construction of Transportation Improvement Program (TIP) number R-1030AA. This report provides the monitoring results for the third formal year of monitoring (Year 2009). The site must demonstrate hydrologic and vegetation success for a minimum of five years or until the site is deemed successful.

The site hydrology is monitored with ten groundwater gauges and one surface water gauge. Groundwater gauges nine and ten were installed at the end of the first growing season and were not included in the first formal year of monitoring. Six of the ten groundwater gauges met the jurisdictional criteria for wetland hydrology (>12.5% of the growing season) in 2009. A surface water gauge was installed at the end of 2007 to record stream flow. Based on the streams design parameters, the data indicates that three bankfull events occurred during the 2009 monitoring period.

Eight vegetation plots were established to monitor the tree planted in the 26.3 acre restoration site. NCDOT replanted the site in March 2007 due to low survival counts for the 2006 planting. The 2009 vegetation monitoring revealed an average density of 485 trees per acre, which is well above the minimum success criteria of 320 trees per acre. The area around plots six and seven were supplementally planted in January 2008 to increase plan survivability. Vegetation plot six was failing during the 2007 monitoring evaluation and the at-planting numbers for vegetation plots six and seven now reflect the supplemental planting that occurred in January 2008.

NCDOT will continue hydrologic and vegetation monitoring at the Jeffrey's Warehouse Mitigation site in 2010.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the wetland monitoring activities that have occurred during 2009 at the Jeffrey's Warehouse Mitigation Site. The site is located adjacent to US 117 in Goldsboro (Figure 1). The site was constructed to provide mitigation for wetland impacts associated with (TIP number) R-1030AA in Wayne County. The 87.7 acre site provides 3.66 acres of riverine wetland restoration, 23.02 acres of non-riverine wetland restoration and 12.36 acres of non-riverine wetland preservation. The site also provides 7.26 acres of Neuse Buffer restoration.

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of five years or until success criteria are satisfied. Success criteria are based on federal guidelines for wetland mitigation. Criteria for hydrologic conditions and vegetation survival are included in these documents. The following report details the results of hydrologic and vegetation monitoring during the 2009-growing season at the Jeffrey's Warehouse Mitigation Site.

1.3 Project History

March/April 2006	Site Planted and Live Staked
March 2007	Site Replanted
March-November 2007	Hydrologic Monitoring (Year 1)
August 2007	Vegetation Monitoring (Year 1)
January 2008	Supplemental Planting Surrounding Plots 6 & 7
March-November 2008	Hydrologic Monitoring (Year 2)
June 2008	Vegetation Monitoring (Year 2)
March-November 2009	Hydrologic Monitoring (Year 3)
June 2009	Vegetation Monitoring (Year 3)

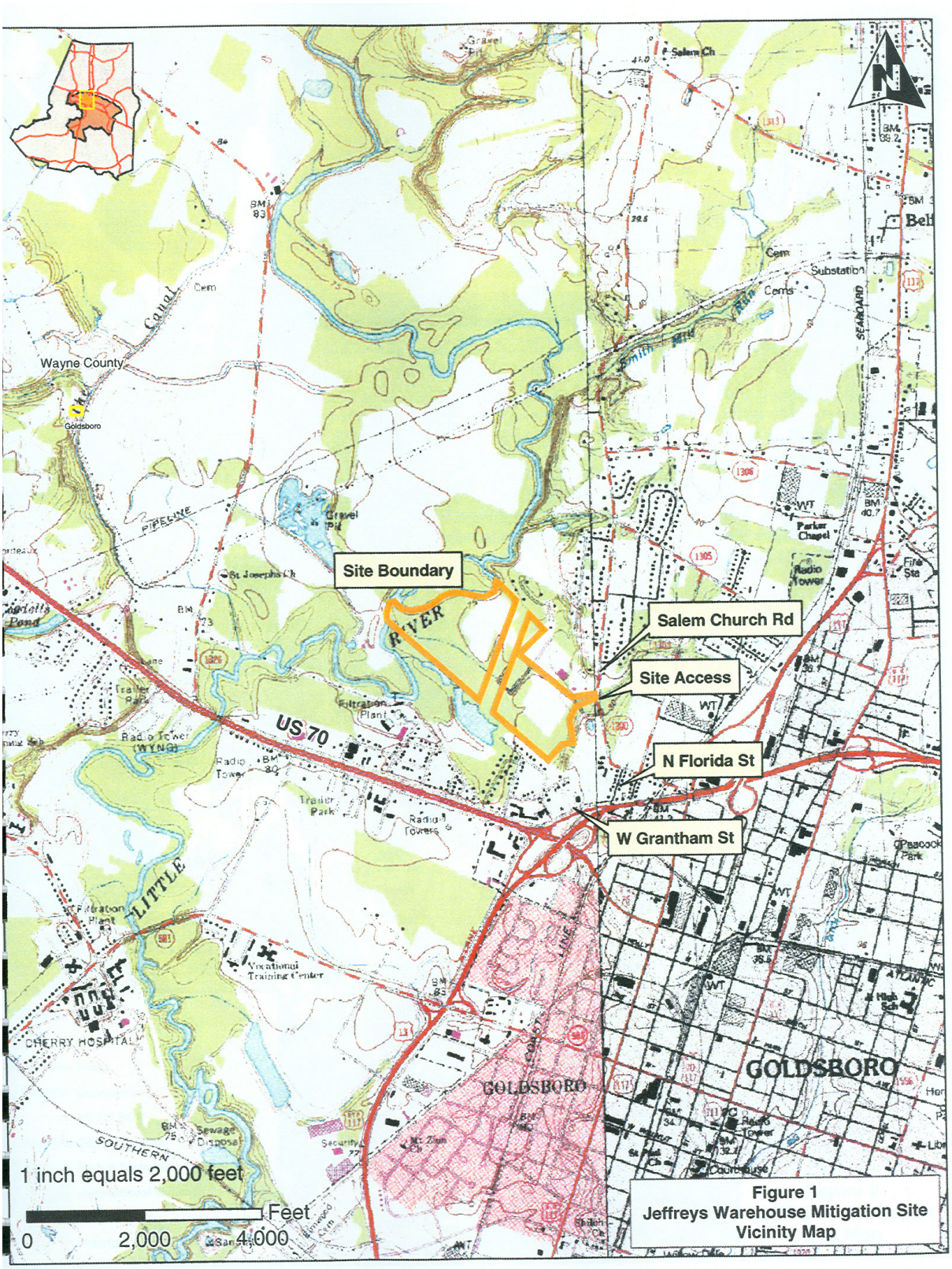

Figure 1. Site Location Map

2.0 HYDROLOGY

2.1 Success Criteria

In accordance with the mitigation plan and permit for wetland mitigation, the success criteria for hydrology states that the area must be inundated or saturated (within 12" of the surface) by surface or ground water for at least a consecutive 12.5% of the growing season. Areas inundated less that 5% of the growing season are classified as non-wetlands. Areas inundated between 5% and 12.5% of the growing season can be classified as wetland depending upon factors such as the presence of hydrophytic vegetation and hydric soils.

The growing season in Wayne County begins March 17 and ends November 14. These dates correspond to a 50% probability that temperatures will remain above 28^{o} F or higher after March 17 and before November 14. The growing season is 243 days; therefore hydrology for 12.5% of the growing season is at least 30 consecutive days, while 8.0% would be equivalent to 18 days. Local climate must represent average conditions for the area in order for the hydrologic data to be valid.

2.2 Hydrologic Description

Ten groundwater monitoring gauges and one surface water monitoring gauge are used to record site hydrologic data. Gauges nine and ten and the surface water gauge were not installed until the end of the 2007 growing season and were not monitored until the 2008 monitoring year. The groundwater gauges are set to record daily water levels wile the surface water gauge is set to record at 3-hour intervals. The hydrologic response (groundwater) to rainfall events is evaluated using data provided by the North Carolina State Climate Office.

Appendix A contains a plot of the water depth for each of the groundwater and surface water monitoring gauges for 2009. Precipitation events, provided by the State Climate Office, are included on each groundwater graph as bars.

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

The total number of consecutive days that the groundwater was within twelve inches of the surface was determined for each groundwater monitoring gauge. This number was converted into a percentage of the growing season. Table 1 presents the hydrologic results for 2009. Figure 3 is a graphical representation of the hydrologic monitoring results for 2009.

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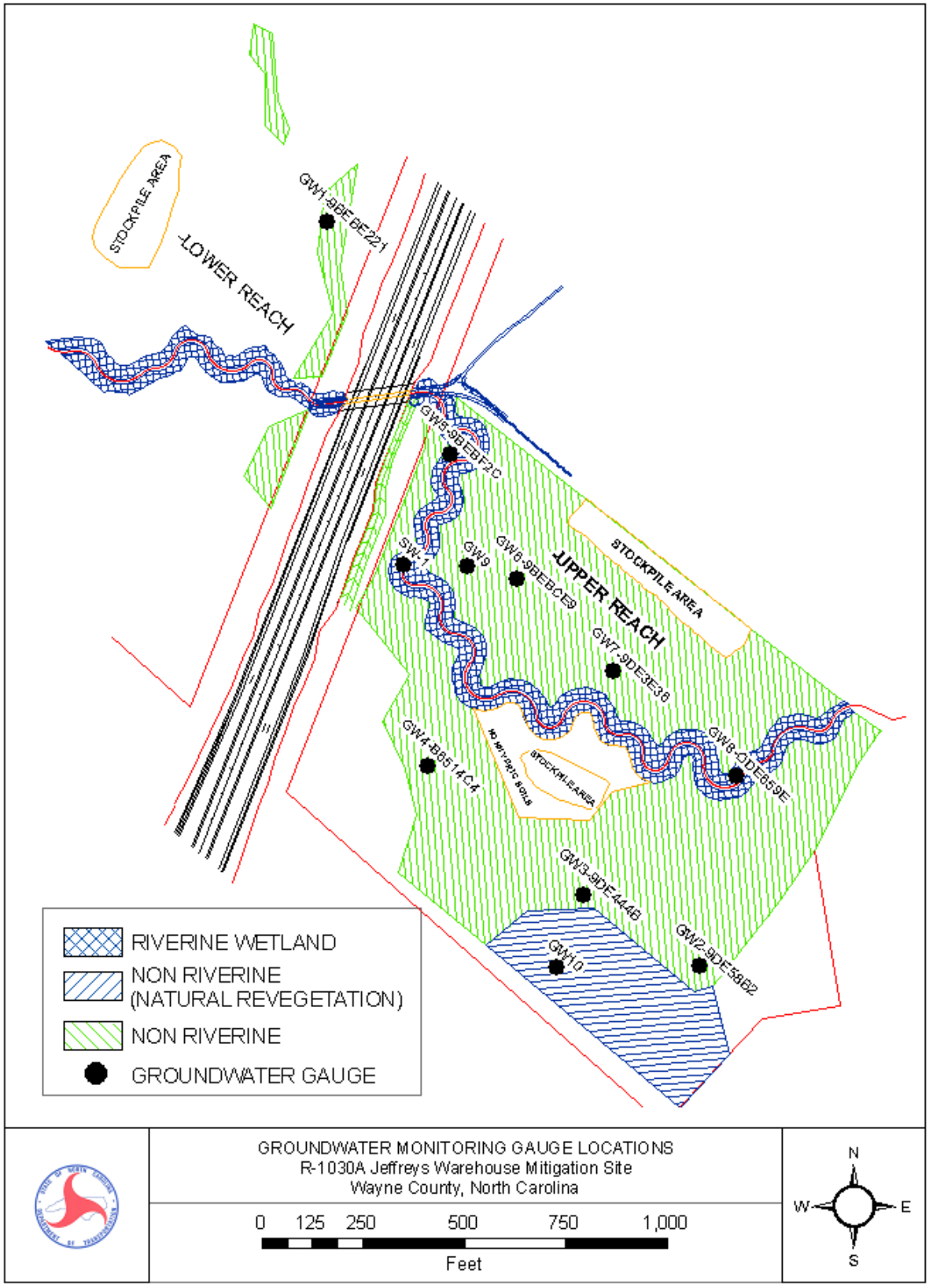


Figure 2. Monitoring Gauge Location Map

Table 1. 2009 Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5 – 12.5%	> 12.5%	Actual %	Dates of Success
JWGW-1			X	14.4	Mar 17-Apr 19
JWGW-2			X	16.0	Mar 17-Apr 23
JWGW-3		X		5.3	
JWGW-4			X	33.7	Mar 17-Jun 5; Jul 14-Sept 13
JWGW-5			X	50.6	Mar 17-Jul 16; Aug 14-Sept 23
JWGW-6		X		11.5	
JWGW-7		X		11.1	
JWGW-8			X	31.3	Mar 17-May 30; Jul 14-Sept 14
JWGW-9		X		11.5	
JWGW-10			X	16.9	Mar 17-Apr 25; Oct 11-Nov 14

*Appendix A contains plots of surface and groundwater data during 2009.

2.3.2 Climatic Data

Figure 4 is a comparison of monthly rainfall for the period of January 2009 through November 2009 to historical precipitation (collected between 1975 and 2008) for Wayne County, Cherry Research Station. This comparison gives an indication of how 2009 relates to historical data in terms of climate conditions. The NC State Climate Office provided all local rainfall information.

For the 2009-year, January, February, March, May, June, and July experienced average rainfall. The months of April, August, September and October recorded below average rainfall for the site while November recorded above average rainfall. Overall 2009 experienced an average rainfall year.

2.4 Conclusions

The 2009 year represents the third full growing season that hydrologic data has been collected on the Jeffrey's Warehouse Mitigation Site. Six of the ten groundwater monitoring gauges met the jurisdictional criteria wetland hydrology (>12.5% of the growing season), while four groundwater gauges met between 5% and 12.5% of the growing season.

NCDOT will continue to monitor the hydrology at the Jeffrey's Warehouse Mitigation Site in 2010.

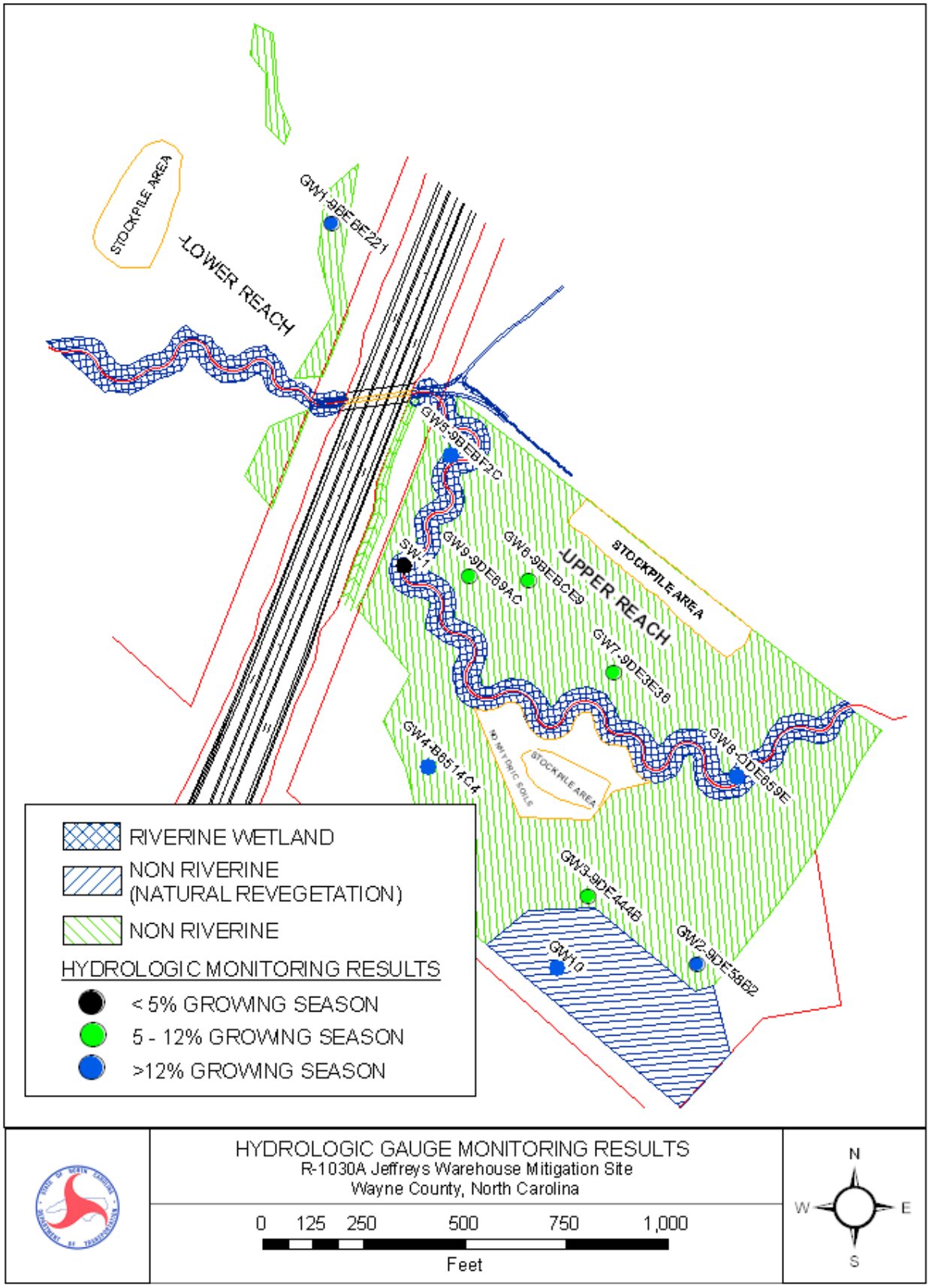


Figure 3. 2009 Hydrologic Monitoring Results

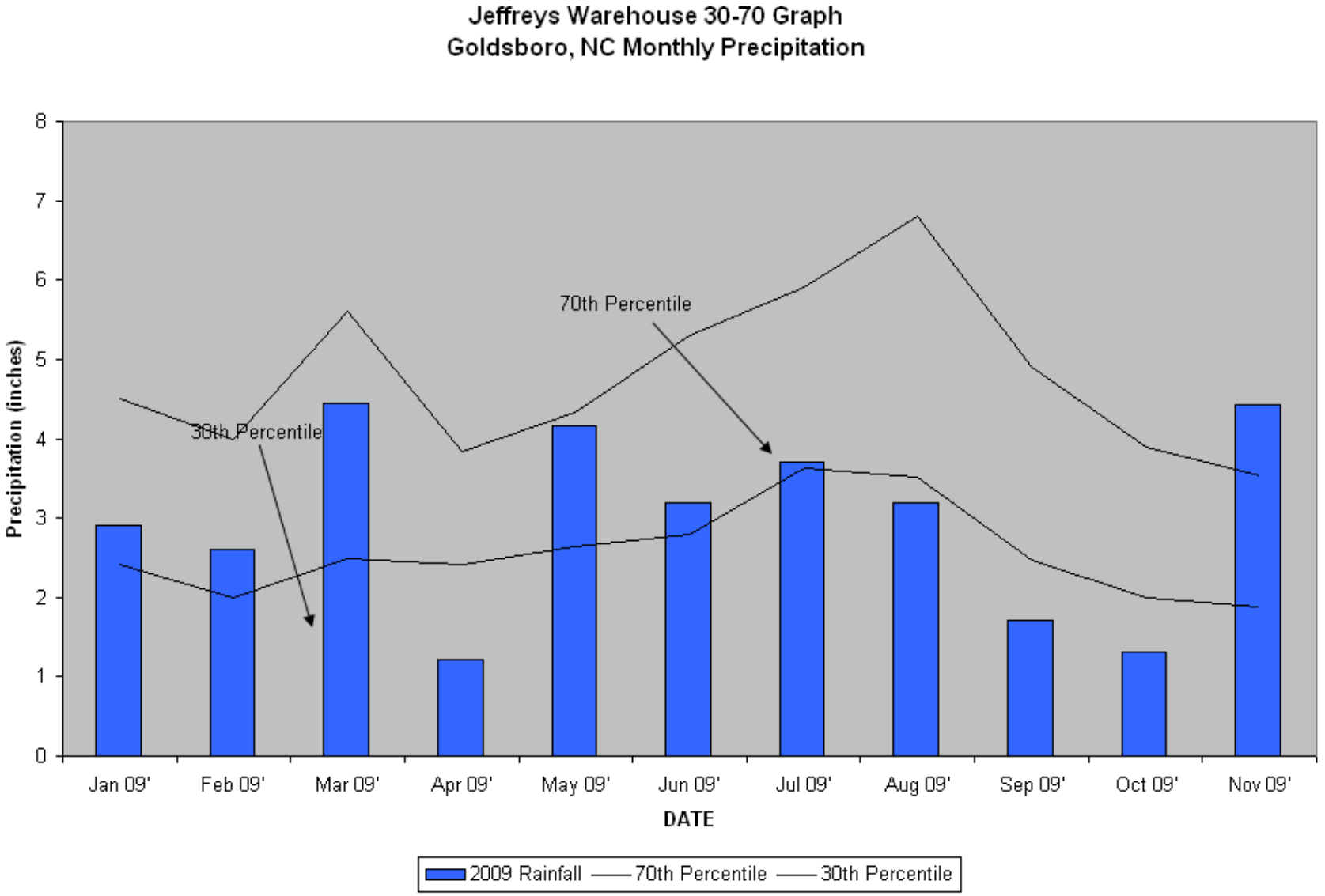


Figure 4. 30-70 Percentile Graph 2009

3.0 VEGETATION: JEFFREY'S WAREHOUSE MITIGATION SITE (YEAR 3 MONITORING)

3.1 Success Criteria

The success criteria states that there must be a minimum of 320 tree per acre living for at least three year consecutive years. A minimum of 290 trees per acre must be living at year four and a minimum of 260 trees per acre must be living at year five.

3.2 Description of Species

The following live stakes were planted on the streambanks:

Salix nigra, Black Willow

Cornus amomum, Silky Dogwood

The following tree species were planted in the Riverine - Bankfull Bench Area:

Quercus laurifolia, Laurel Oak

Quercus lyrata, Overcup Oak

Quercus phellos, Willow Oak

Quercus nigra, Water Oak

Quercus michauxii, Swamp Chestnut Oak

Betula nigra, River Birch

The following tree species were planted in the Non-Riverine Wetland Area:

Quercus laurifolia, Laurel Oak

Quercus phellos, Willow Oak

Quercus michauxii, Swamp Chestnut Oak

Quercus falcata var. *pagodaefolia*, Cherrybark oak

Nyssa aquatica, Water Tupelo

3.3 Results of Vegetation Monitoring

Table 2. Vegetation Monitoring Statistics

Plot #	Laurel Oak	Overcup Oak	Willow Oak	Water Oak	Swamp Chestnut Oak	River Birch	Cherrybark Oak	Water Tupelo	Total (3 Year)	Total (at planting)	Density (Tree/Acre)
1	2	1	2		2	12			19	37	349
2	2		8	1	17		17	2	47	47	680
3	3		3		15		9		30	40	510
4	11		6				27		44	45	665
5	3		2			3			8	33	165
6			2		6		12	4	24	42	389
7	5		4		6		13	1	29	39	506
8	1	15		3	4	8			31	34	620
	Average Tree Density										**485**

Site Notes: Other species noted: lespedeza, cattail, black willow, silky dogwood, ragweed, fennel, woolgrass, *Juncus* sp., sweetgum, goldenrod, wax myrtle, multi-flora rose, *Scirpus* sp., red maple, tear thumb, briars, alder, *Baccharis* sp., and various grasses. River birch was also noted volunteering in the Non-Riverine Wetland. Beaver activity continues to be a problem on site and NCDOT is working with USDA to manage the beaver activity. Vegetation Plot #5 is showing a significant loss in trees due to beaver activity on site, however, around the vegetation plot's perimeter the following tree species are surviving: river birch, laurel oak, swamp chestnut oak, water oak, tag alder, and black willow.

3.4 Conclusions

Approximately 26.3 acres of this site was planted in March and April 2006. NCDOT replanted the site in March 2007 due to low survival counts from the 2006 planting. The area around plots six and seven were supplementally planted in January 2008 to increase plant survivability in this area. The at-planting numbers for vegetation plot six and seven reflect this supplemental planting that took place in January 2008. There

were eight vegetation monitoring plots established throughout the Riverine and Non-Riverine areas. The 2009 vegetation monitoring revealed an average density of 485 trees per acre, which is above the minimum success criteria of 320 trees per acre. NCDOT will continue to monitor the vegetation at Jeffreys Warehouse Mitigation Site in 2010.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

The 2009 year represents the third full growing season that hydrologic data has been collected on the Jeffrey's Warehouse Mitigation Site. Six of the ten groundwater monitoring gauges met the jurisdictional criteria for wetland hydrology (>12.5% of the growing season), while four groundwater gauges met between 5% and 12.5% of the growing season.

There were eight vegetation monitoring plots established throughout the Riverine and Non-Riverine areas. The 2009 vegetation monitoring revealed an average density of 485 trees per acre, which is well above the minimum success criteria of 320 trees per acre.

NCDOT will continue hydrologic and vegetation monitoring at the Jeffrey's Warehouse Mitigation Site in 2010.

APPENDIX A

DEPTH TO GROUNDWATER CHARTS

APPENDIX B

SITE PHOTOS, PHOTO LOCATIONS, AND PLOT LOCATIONS MAP

Jeffrey’s Warehouse

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

June 2009

Jeffrey's Warehouse

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

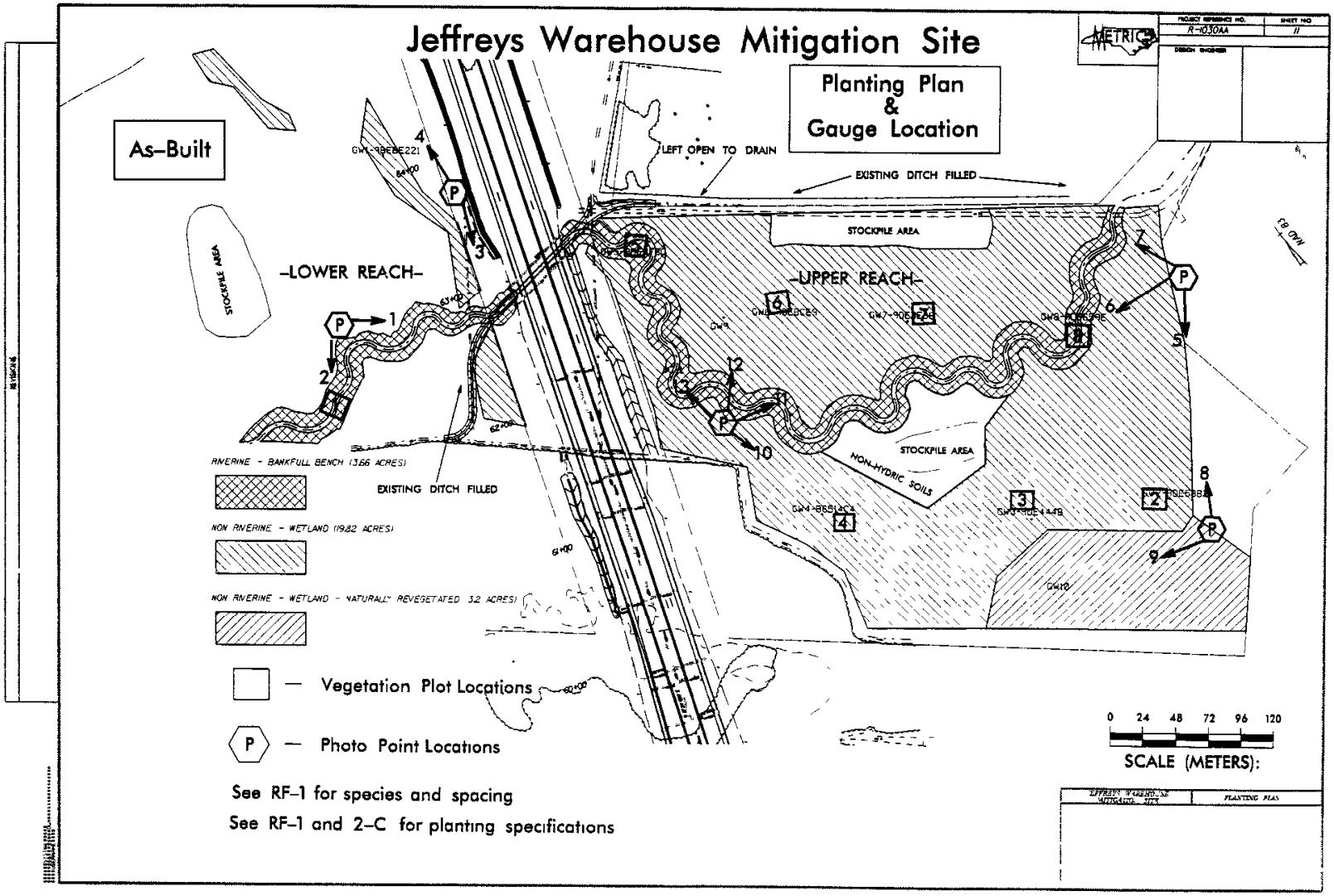
Photo 12

June 2009

Jeffrey's Warehouse

Photo 13

June 2009


Jeffreys Warehouse Mitigation Site
Planting Plan & Gauge Location
As-Built
METRIC
PROJECT REFERENCE NO. R-1030AA
SHEET NO. 11
-LOWER REACH-
-UPPER REACH-
STOCKPILE AREA
LEFT OPEN TO DRAIN
EXISTING DITCH FILLED
NON-HYDRIC SOILS
RIVERINE - BANKFULL BENCH (3.66 ACRES)
NON RIVERINE - WETLAND (1.92 ACRES)
NON RIVERINE - WETLAND - "NATURALLY" REVEGETATED 3.2 ACRES)
Vegetation Plot Locations
Photo Point Locations
See RF-1 for species and spacing
See RF-1 and 2-C for planting specifications
0 24 48 72 96 120
SCALE (METERS):
PLANTING PLAN